Commissioner for Patents Serial No. 10/770,474

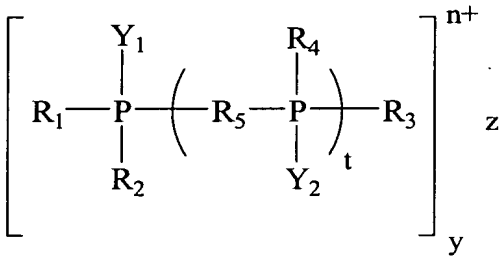
CLAIM AMENDMENTS

Please amend claims 1, 16, 18, 19, 21, 22, 23, 24, and 34, and cancel claims 20 and 25, as set out hereinafter.

There follows a full set of claims with status identifiers and with current amendments identified.

1. (currently amended) A method of bleaching and brightness stabilization of a lignocellulosic ~~material~~ pulp comprising:

i) bleaching the lignocellulosic ~~material~~ pulp, in an aqueous medium with a water-soluble phosphine or phosphonium compound of formula (A):



$$\left[R_1 - P(Y_1)(R_2) - \left(R_5 - P(R_4)(Y_2) \right)_t - R_3 \right]_y^{n+} \; z\,[X]^{m-} \qquad (A)$$

wherein t is zero or 1;

when t = 0, $R_4R_5PY_2$ is absent and R_3 is bonded to the P of the $R_1R_2PY_1$ group;

when t = 1, R_5 is absent such that there is a P-P bond, or R_5 is an alkylene group $(CH_2)_s$ (s = 1 to 12) interrupted by 0 to 6 oxygen (O) atoms or secondary amino (NR') groups, and/or substituted by a zero to 2s number of a hydroxyl, alkyl, aryl, thio, thioether, amino, ester, amide, carboxyl and/or carboxylate groups, or a phenylene group substituted by a zero to 4 number of a hydroxyl, alkyl, aryl, thio, thioether, amino, ester, amide, carboxyl, carboxylate, and/or sulfonate groups; ~~or preferably R_5 is an alkylene group $(CH_2)s$ (s = 1 to 4) where the carbon chain is optionally interrupted by one or two oxygen (O) atom(s);~~

m is an integer of 0 to 5 and y is an integer of 1 or more, and n and z are integers of 0 or more such that yn = zm;

when y = 1, and n = z = m = 0, then X is absent;

R_1, R_2 and R_3, or R_1, R_2, R_3, R_4 and R_5 groups are collectively selected such that said compound of formula (A) has an overall solubility of at least 0.01 g/L;

R_1, R_2 and R_3, or R_1, R_2, R_3 and R_4 are independently selected from hydrogen, optionally substituted linear or branched alkyl groups, or optionally substituted aryl groups, the optional substitution being the presence of substituents selected from ether, amino, hydroxy, ester, thioether, amide, carbonyl, carboxyl, and carboxylate moieties; and

Y_1 and Y_2 are independently absent or a carboxylate moiety~~,~~ ; or

when X is present, X is an inorganic or organic anion, and the value of m is ≤ 5; the total charge of yn = zm; and

Y_1 is a hydroxymethyl group (CH_2OH); R_1, R_2 and R_3, or R_1, R_2, R_3, R_4 and Y_2 are independently selected from hydrogen, boron trifluoride (BF_3), optionally substituted linear or branched alkyl groups, or optionally substituted aryl groups, the optional substitution being the presence of substituents selected from ether, amino, hydroxy, ester, thioether, amide, carbonyl, carboxyl, and carboxylate moieties; and

ii) stabilizing the brightness in the resulting bleached lignocellulosic ~~material~~ pulp with said compound of formula A of said bleaching in step i).

2. (original) A method according to claim 1 wherein Y_1 and Y_2 are both absent, R_1, R_2 and R_3, or R_1, R_2, R_3 and R_4 are independently hydrogen, an alkyl group (R) or an ether group (OR) with R being $(CH_2)_qH$ (q = 1 to 12) interrupted by 0 to 6 oxygen (O) atoms or secondary amino (NR') groups, and/or substituted by a zero to (2q + 1) number of a hydroxyl, thio, thioether, amino, ester, amide, carboxyl and/or carboxylate groups. R' is either hydrogen or an optionally substituted linear or branched alkyl group or optionally substituted aryl group; whereun optional substitution refers to the presence of one or more substituents selected from ether, amino, hydroxy, ester, thioether, amide, carbonyl, carboxyl, and carboxylate moieties.

3. (original) A method according to claim 1, wherein Y_1 and Y_2 are both absent, R_1, R_2 and R_3, or R_1, R_2, R_3 and R_4 are independently hydrogen, an alkyl group (R) or an ether group (OR) with R being $CH_2(CH_2)_qH$ (q = 0 to 5) interrupted by 0 to 3 oxygen (O) atoms or secondary amino (NR') groups, and/or substituted by a zero to (2q + 1) number of a hydroxyl, thio, thioether, amino, ester, amide, carboxyl and/or carboxylate groups.

4. (original) A method according to claim 1, wherein Y_1 and Y_2 are both absent, at least one of R_1 and R_2 is the same as R_3 in the molecule with R_3 being a hydroxymethyl (CH_2OH) group.

5. (original) A method according to claim 1, wherein Y_1 and Y_2 are both absent, R_1, R_2 and R_3, or R_1, R_2, R_3 and R_4 are all hydroxymethyl (CH_2OH) groups.

6. (previously presented) A method according to claim 1, wherein Y_1 is a hydroxymethyl group (CH_2OH), R_1, R_2 and R_3, or R_1, R_2, R_3, R_4 and Y_2 are independently hydrogen, boron trifluoride (BF_3), an alkyl group (R) or an ether group (OR) with R being $(CH_2)_qH$ (q = 1 to 12) interrupted by 0 to 6 oxygen (O) atoms or secondary amino (NR') groups, and/or substituted by a zero to (2q + 1) number of a hydroxyl, thio, thioether, amino, ester, amide, carboxyl and/or carboxylate groups, R' is either hydrogen or an optionally substituted linear or branched alkyl group or optionally substituted aryl group; wherein optional substitution refers to the presence of substituents selected from ether, amino, hydroxy, ester, thioether, amide, carbonyl, carboxyl, and carboxylate moieties.

7. (previously presented) A method according to claim 1, wherein Y_1 is a hydroxymethyl group (CH_2OH), R_1, R_2 and R_3, or R_1, R_2, R_3, R_4 and Y_2 are independently hydrogen, boron trifluoride (BF_3), an alkyl group (R) or an ether group (OR) with R being $CH_2(CH_2)_qH$ (q = 0 to 5) interrupted by 0 to 3 oxygen (O) atoms or secondary amino (NR') groups, and/or substituted by a zero to (2q + 1) number of a hydroxyl, thio, thioether, amino, ester, amide, carboxyl and/or carboxylate groups.

8. (original) A method according to claim 1, wherein X is selected from chloride, sulfate, hydroxide, hydrosulfite, phosphate, carbonate, bicarbonate, bisulfate, alkoxide, formate, acetate, citrate, oxalate, ascorbate, ethylenediaminetetraacetate or diethylenetriaminepentaacetate.

9. (previously presented) A method according to claim 1, wherein Y_1 is a hydroxymethyl group (CH_2OH), and at least one of R_3, R_4 and Y_2 is a hydroxymethyl (CH_2OH) group.

10. (original) A method according to claim 1 wherein said compound is the phosphine

tris(hydroxymethyl)phosphine (THP), $P(CH_2OH)_3$.

11. (original) A method according to claim 1 wherein said compound is the phosphine tris(hydroxypropyl)phosphine (THPP), $P(CH_2CH_2CH_2OH)_3$.

12. (original) A method according to claim 1 wherein said compound is the phosphine bis[bis(hydroxymethyl)phosphino]ethane, $(HOCH_2)_2PCH_2CH_2P(CH_2OH)_2$.

13. (original) A method according to claim 1 wherein said compound is the phosphonium compound tetrakis(hydroxymethyl)phosphonium chloride (THPC), $[P(CH_2OH)_4]Cl$.

14. (original) A method according to claim 1 wherein said compound is the phosphonium compound tetrakis(hydroxymethyl)phosphonium sulfate (THPS), $[P(CH_2OH)_4]_2SO_4$.

15. (original) A method according to claim 1 wherein said compound is the phosphonium compound 3-[tris(hydroxymethyl)phosphonium]propionate, $(CH_2OH)_3P^+\text{-}CH_2CH_2COO^-$.

16. (currently amended) A method according to claim 1 wherein said lignocellulosic ~~material~~ pulp is a mechanical wood pulp.

17. (original) A method according to claim 16 wherein said lignocellulosic mechanical wood pulp is spuce TMP or aspen CTMP.

18. (currently amended) A method according to claim 1 wherein the said lignocellulosic ~~material~~ pulp is a mechanical wood pulp that has been partially or fully bleached with alkaline hydrogen peroxide and/or sodium dithionite.

19. (currently amended) A method according to claim 1 wherein the said lignocellulosic ~~material~~ pulp is a chemical wood pulp partially or fully delignified and/or bleached with oxygen and/or chlorine dioxide.

20. (cancelled)

21. (currently amended) A method according to claim 1 wherein the bleaching and brightness stabilization are conducted in ~~an~~ said aqueous medium at a pH of 2.0 – 12.0, a temperature of 20 – 170 °C and a consistency of 0.01 – 99% for 5 minutes to 30 days with a charge of the phosphorus compound being 0.01 to 6.0%, by weight, based on the oven-dry (OD) weight of the lignocellulosic ~~material~~ pulp.

22. (currently amended) A method according to claim 1 wherein the bleaching and brightness stabilization are conducted at a temperature of 20 – 170 °C and a consistency of 40 – 99% for 5 minutes to 30 days with a charge of the phosphorus compound being 0.01 to 6.0%, by weight, based on the oven-dry (OD) weight of the lignocellulosic ~~material~~ pulp.

23. (currently amended) A method according to claim 1 wherein the bleaching and brightness stabilization are carried out in a single-stage or multi-stage in one or more than one bleach tower, pulp mixer, a storage vessel, an agitated tank or any other stock preparation vessels of a paper machine, or any other vessels suitable for performing the bleaching and brightness stabilization of the lignocellulosic ~~material~~ pulp.

24. (currently amended) A method according to claim 1, wherein the ~~material~~ pulp is also treated with: (a) a benzotriazole, benzophenone or titanium dioxide ultraviolet absorber (UVA), or a hindered hydroxyamine radical scavenger (RS), (b) a poly(ethylene glycol) or poly(vinyl pyrrolidone) yellowing inhibitor, and/or (c) a metal chelating agent.

25. (cancelled)

26. (cancelled)

27. (cancelled)

28. (cancelled)

29. (cancelled)

30. (cancelled)

31. (cancelled)

32. (cancelled)

33. (cancelled)

34. (currently amended) A process according to claim 1, wherein the lignocellulosic ~~material~~ pulp is additionally bleached with sodium dithionite.